# NRL's Integrated Atom Optics Laser Cooling & Trapping

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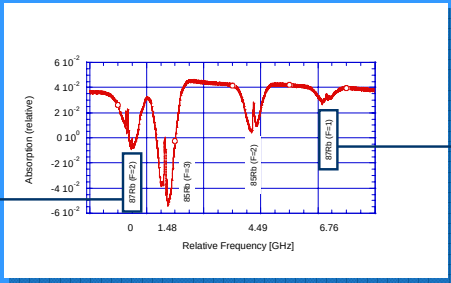
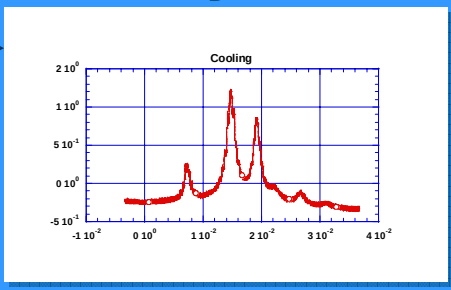
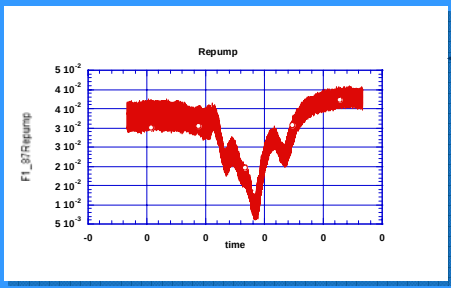
## Saturation Absorption Spectrum of Rb D2 Transitions

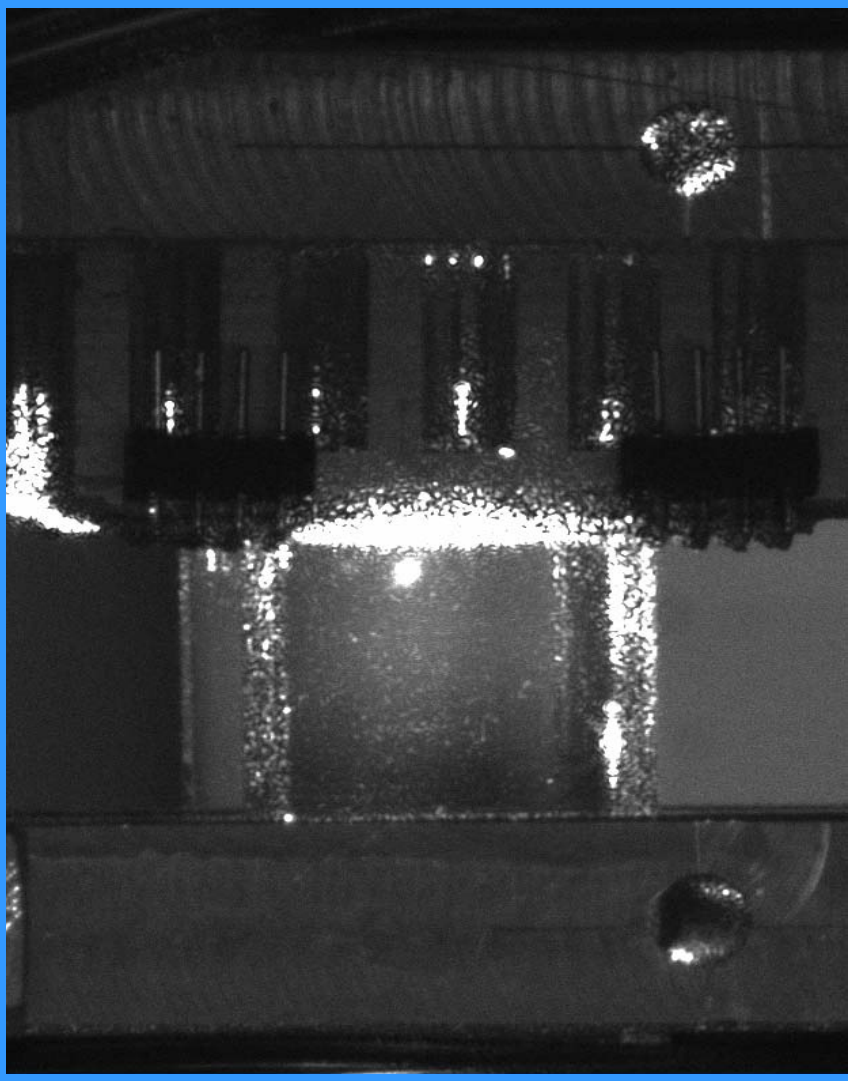



## 87Rb F=2 "Cooling"

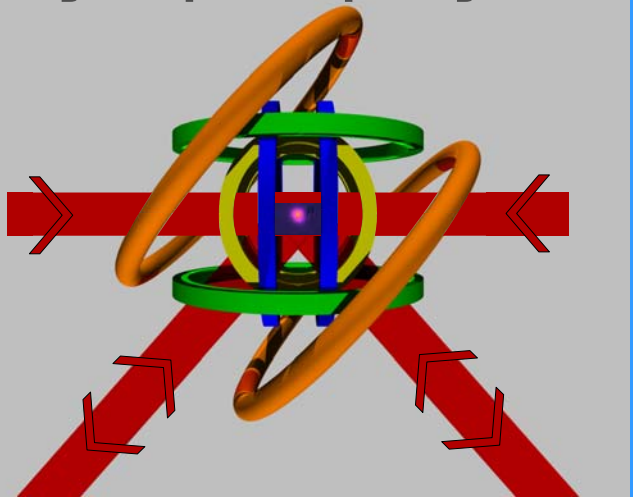



## 87Rb F=1 "Repump"



## Magneto-Optical Trap Configuration



## Summary

NRL's Integrated Atom Optics Program achieves its first chip scale Laser cooling with counter propagating laser beams and magnetic trap allowing formation of cold Rubidium87 atoms. The "ball" of bright sphere called the "Magneto Optical Trap" above contains approximately 6-7x$10^6$ atoms at ~200uK. From here, it is possible for formation of Bose-Einstein Condensation which further drops the temperature to the ~ nK range. BEC can be used to develop highly sensitive inertial sensors such as gravimeter, magnetometer, interferometer and can be used to create much higher accurate atomic clock.